African Journal of Health, Nursing and Midwifery
ISSN: 2689-9418
Volume 5, Issue 4, 2022 (pp. 124-138)
www.abjournals.org

DIFFERENTIAL UTILISATION OF TWO THERAPEUTIC METHODS IN THE MANAGEMENT OF DIARRHOEA AMONG UNDER-FIVE CHILDREN ATTENDING PRIMARY HEALTH CARE CENTRES IN OYO STATE, NIGERIA

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Cite this article:

Oyewumi Zaccheus Opeyemi (2022), Differential Utilisation of two Therapeutic Methods in the Management of Diarrhoea among Under-Five Children Attending Primary Health Care Centres in Oyo State, Nigeria. African Journal of Health, Nursing and Midwifery 5(4), 124-138. DOI: 10.52589/AJHNM-OO8SWQE8

Manuscript History

Received: 26 Oct 2022

Accepted: 18 Nov 2022

Published: 30 Nov 2022

ABSTRACT: *Diarrhoea remains the leading killer of children, accounting for approximately 9 percent of all deaths among children under age 5 worldwide in 2019. This translates to over 1,300 young children under five dying each day, or about 484,000 children a year, despite the availability of a simple treatment solution like the use of oral rehydration therapy (ORS) and zinc supplements. Therefore, this study evaluated the differential utilisation of ORS and Zinc supplements in the management of diarrhoea among under five children attending primary health care centres in Oyo State, Nigeria from 2017 to 2021. The researcher conducted a retrospective cohort study from 2017 to 2021 to evaluate the differential utilisation of ORS and Zinc supplements in the management of diarrhoea among under five children in Oyo State, Nigeria. Secondary analysis of the treatment data from selected primary health care centres in Oyo State was conducted from 2017 to 2021; the number of patients diagnosed of diarrhoea with their age group and treated with either ORS or zinc supplements on admission were analysed for each year at each of the PHC. A significant positive, near perfect correlation was found to occur between number of diarrhoea cases and ORS usage and age range (r= 0.983; p=0.01) and number of diarrhoea cases with Zinc usage (r= 0.914; p= 0.01); translating to the fact that ORS and Zinc usages increased with increased number of diarrhoea cases. Increase in ORS usage also positively correlates with usage of Zinc among the under five children. It was concluded that the most affected age group with the highest diarrhoea rate are children within 12-59 months. There is thus a need to improve the sensitisation of the use of oral rehydration therapy and zinc supplements by the health care workers in our Primary Health Care centres. Again, adequate preventive and control strategies should be put in place at the PHC, Local and State levels to improve on data reporting on cases of under-five diarrhoea disease.*

KEYWORDS: Differential utilisation, Oral Rehydration Salt and Zinc Supplements.

Article DOI: 10.52589/AJHNM-OO8SWQE8
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INTRODUCTION

Diarrhoeal disease, although preventable and treatable, has remained a worrisome disease and the second leading cause of mortality and morbidity in children under five years in the world. The outbreak of this disease is not unconnected to the lack of a good source of water and poor food preparation and preservation (WHO, 2017). However various therapeutic methods have been deployed to its management but the question of the utilisation remains to be answered. According to the World Health OrganisationOrganisation (2017), diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than the normal for the individual). Frequent passing of formed stools is not diarrhoea, nor is the passing of loose, "pasty" stools by breastfed babies.

UNICEF (2022) in its report on the death toll of under 5 years children affirmed that many children could be saved through basic interventions. It went further to assert that diarrhoea still remains the leading killer of children, accounting for approximately 9 percent of all deaths among children under age 5 worldwide. This translates to over 1,300 young children dying each day, or about 484,000 children a year, despite the availability of a simple treatment solution. Most deaths from diarrhoea occur among children less than 5 years of age living in South Asia and sub-Saharan Africa. Despite this heavy toll, progress is being made to halt the incidence of death resulting from diarrhoea.

Across the world, over 780 million individuals lack access to improved drinking-water and 2.5 billion lack improved sanitation. This may be the reason for the alarming death rate of approximately four million children less than 5 years of age in Asia, Africa, and Latin America that die annually from diarrhoea; and 80% of these deaths occur in the first year of life. Diarrhoea due to infection is widespread throughout developing countries. Not less than an average of three episodes of diarrhoea disease is being experienced in low-income countries. Each episode deprives the child of the nutrition necessary for growth. As a result, diarrhoea is categorised as a major cause of malnutrition, and malnourished children are more likely to fall ill from diarrhoea. Furthermore, globally there are nearly 1.7 billion cases of childhood diarrhoeal disease every year out of which 525,000 under five year children died of the disease (Jabeen et al., 2021; WHO, 2017).

In a study conducted in rural India by Saha et al. (2022) to assess the Occurrence of Diarrheal Disease among Under-Five Children and Associated Sociodemographic and Household Environmental Factors, out of a total of 188,521 living children (0–59 months) that were studied from the National Family Health Survey-4, (NFHS-4) 2015–2016, children aged 12–23 months, 24–35 months, 36–47 months, and 48–59 months were documented to be significantly improbable to suffer diarrheal disease. Female children, as well as children of scheduled tribes (ST) and other backward classes (OBC), were less likely to experience diarrhoea. The disease was more likely to occur among children of scheduled castes (SC); Muslim or other religions; children belonging to central, eastern, and western regions; children with low birth weight; as well as children with improper stool disposal and rudimentary roof materials. In the rural parts of India, sociodemographic and household environmental factors were most influential. Effective community education, improved hand washing practices, pure water supply, and proper waste disposal, including building and utilising latrines, were identified to reduce the burden of diarrheal disease in children.

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Nigeria Demographic and Health Survey (NDHS) (2018) documented that diarrhoea was most common among children aged 12–23 months and least common among those aged 48–59 months. Kenya Demographic and Health Survey (KDHS) showed that the prevalence of diarrhoea is highest in children aged between 6 and 11 months, followed closely by children between the ages of 12 and 23 months (Kenya DHS, 2014).

Study conducted by Bekele et al. (2021) to determine determinants of diarrhoea among under five year old children in the health extension model and non-model families of Wama Hagelo District 2019 revealed that diarrhoea was more frequent among non-model than model families. Family size, type of water source, usage of latrine, place of childbirth, child vaccination against Rotavirus, and vitamin A supplementation were independently associated with the occurrence of diarrhoea in under-five children

A study conducted in Plateau state, Nigeria on the patterns of diarrhoea cases among under five children from 2013 to 2017 reported the highest annual cases of diarrhoea of 24% in 2017, and the lowest was 13% in 2013 with the most affected age group to be 12–59 months. The age-specific case fatality rate was highest in children < 1 month and lowest in the older age group 12–59 months. The study also depicted seasonal variation of diarrheal disease in this age group with most cases reported in the first and third quarters of the year having peaked in the dry and rainy seasons (Jiwok et al., 2021).

The diarrhoea prevalence rate among under-five children in Nigeria is 10% (National Population Commission, 2018). There are a lot of vulnerable children at risk of death from diarrhoea in Nigeria (Peter & Umar, 2018). To reduce diarrhoea mortality and morbidity, studies have helped inform intervention programs especially before the rainy season in regions with majority of cases (Anyorikeya et al., 2016), allocation of limited resources and securing commodity supply chain to avoid stock outs (Hashi et al., 2016), training and deployment of staff to remote and hard to reach communities (Bhan et al., 2019).

However, several interventions have been designed to reduce the under-five mortality rate (U5MR) resulting from diarrhoea. These interventions include safe drinking water, use of improved sanitation and hand washing with soap, treatment with oral rehydration solution (ORS), a solution of clean water, sugar and salt. In addition, a 10-14 day supplemental treatment course of dispersible 20mg zinc tablets shortens diarrhoea duration and improves outcomes (WHO, 2017).

The availability and accessibility of ORS and zinc to all children with diarrhoea, especially those in poor, rural and marginalised populations, could save the lives of hundreds of thousands of additional children each year. These interventions have proven to be cost-effective, affordable and relatively straightforward to implement. However, the number of children under age 5 with diarrhoea who receive the recommended treatment of oral rehydration solution is too low across regions. In sub-Saharan Africa, progress on this important intervention has been tarrying over the last decade with coverage at 31 percent in 2011 and 36 percent in 2021. Despite the global recommendation to include ORS and zinc supplementation for diarrhoea, global coverage of this intervention also remains extremely low, especially in sub-Saharan Africa where coverage was 18 percent in 2021. Overall, much more needs to be done to ensure that all children are receiving both ORS and zinc as part of treatment for diarrhoea. Across all regions and residence types, ORS coverage is inadequate. Although children in urban areas, where health services are more available, are more likely to receive this recommended

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treatment than children in rural areas where coverage remains far from optimal no matter the setting (UNICEF, 2022).

Furthermore, in a study conducted in Nigeria, only two-thirds of healthcare workers were aware of zinc supplementation, 35% of them prescribed zinc when managing childhood diarrhoea and 10% of these do so for every case of childhood diarrhoea. But success in reducing diarrhoeal morbidity and mortality by administering zinc to children with diarrhoea depends on the knowledge and acceptance of zinc by the parents/caregivers of these children. In Nigeria, there has been paucity of studies on the differential utilisation of ORS and Zinc in the management of diarrhoea among under five year children. In order to assess the differential utilisation of ORS and Zinc Oxide in the management of diarrhoea disease among the under five year old children and find a way of promoting its usage, this study becomes imperative.

Objective of the Study

Main Objective of the Study

The main objective of this study is to analyse the differential utilisation of oral rehydration salt and zinc therapy in the management of diarrhoea among under five children attending primary health care centres in Oyo State, Nigeria.

Specific Objectives of the Study

The following specific objectives are designed to:

1. analyse annual reported cases of diarrhoea disease among under five children from 2017 to 2021 through secondary data;
2. identify the frequency of diarrhoea disease among under five children from 2017 to 2021 through secondary data;
3. evaluate the level of utilisation of ORS in the management of diarrhoea among under-five children from 2017 to 2021; and to
4. analyse the level of utilisation of zinc supplements in the management of diarrhoea among under-five children from 2017 to 2021.

Research Hypotheses

Ho1. There is no statistical relationship between the frequency of diarrhoea disease and the use of ORS in the management of diarrhoea among under-five children in the selected PHC centres in Oyo State.

Ho2 There is no statistical relationship between the frequency of diarrhoea disease and the use of zinc supplements in the management of diarrhoea among under-five children in the selected PHC centres in Oyo State.

Ho3 There is no statistical relationship between the use of ORS and zinc supplements in the management of diarrhoea disease among under-five children attending selected PHC Centres in Oyo State.

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Justification of the Study

The 3rd and 4th aspects of the Sustainable Development Goals (MDGs) advocate for a significant reduction of child mortality by 2030; the true picture is that while progress is being made, much more remains to be done. The prevalence rate of diarrhoea in Nigeria is 18.8% and is a menace in sub-Saharan Africa; also in West Africa, it accounts for an estimated 150,000 deaths yearly amongst children under five due to poor hygienic and sanitary practices. Diarrhoeal status as the second leading killer of children under five is an alarming reminder of the vulnerability of children in Nigeria; saving the lives of millions of children at risk of death from diarrhoea is possible with a comprehensive strategy that ensures all children in need receive critical prevention and treatment measures (Peter et al., 2018). Aside from every other routine measure that can be deployed in the management of this disease, the use of ORS and zinc supplements would be of immense benefit. In Nigeria, of the 732,000 deaths of children under five years of age, 103,000, representing 14%, are caused by diarrhoeal diseases. Access to appropriate treatment is low at 39%. Surveys have shown that only 33% of Nigeria's children suffering from diarrhoea get ORS products and only 35% prescribe zinc all the time (Firima & Forsberg, 2020).This present study has been written with the intent to encourage the use of ORS and Zinc in the management of diarrhoea among under five children in Primary Health Centres in Oyo State, Nigeria.

Significance of the Study

Although several studies have been conducted on the use of Oral Rehydration Salt and Zinc in the management of diarrhoea among under five children in both developed and developing countries, none has been conducted on the differential utilisation of ORS and Zinc supplements. This present study will analyse the differential utilisation of ORS and Zinc supplements in the management of diarrhoeal disease among under five years children and the frequency of under five diarrhoea cases in the selected Primary Health Centres in Oyo State. The study will also assess the level of compliance of the utilisation of the two therapies as prescribed by WHO in the management of diarrhoea among under five children attending the selected Primary Health Care Centres.

The study will also afford the researcher the opportunity of monitoring the compliance to the treatment regimen with ORS and Zinc for accurate research outcome documentation. More importantly, this is a study that will enhance policy formulation on diarrhoea disease management among under five children attending the primary health centres in Oyo State. Scaling up the new treatment of diarrhoea among under five in the PHC setting is a major undertaking that will reduce to the barest minimum the under five mortality rate in Oyo State and Nigeria as a whole. The study will explain the importance of using the two therapeutic methods in PHC, the frequency and duration of treatment, and its acceptability prior to rolling it out to the entire PHC in Oyo State through the state ministry of health as an efficacious strategy in the treatment of under five year children in the state.

Delimitation of the study

The study will be delimited to the under five year children who have come down with diarrhoea disease and have been managed at the selected Primary Health Centres in Oyo State, Nigeria.

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METHODOLOGY

Research Design

The researcher conducted a retrospective cohort study. The frequency of diarrhoea among under five children and the differential utilisation of oral rehydration salt and zinc supplements from 2017 to 2021 were analysed in the selected primary health care centres in Oyo state.

Study Setting

The study population comprises the male and female under five years children that have been attending the selected primary health care centres in Oyo State with diarrhoea disease from 2017 to 2021. Oyo state has 33 local government areas but the present study was carried out in four Primary Health Care Centres located in four local government areas (LGAs) of Oyo State, which are: Ogbomoso North, Ogbomoso South, Surulere and Orire.

Population

The study focused on children under five years of age in the selected primary health centres in Oyo State who had had diarrhoea from 2017 to 2021 and have been treated with either ORS or Zinc supplements.

Inclusion criteria

Participants eligible for inclusion in this study include:

1. under five children who have attended the selected PHC from 2017 to 2021 with the episode(s) of diarrhoea disease, and
2. under five children who have benefited from either ORS or Zinc supplements from 2017 to 2021 and their records are properly documented.

Exclusion criteria

All under five years children diagnosed of diarrhoea from 2017 to 2021 but were not treated with either ORS or Zinc supplements were excluded.

Sample Size and Sampling Technique

Sampling Size

Total enumeration was used to select all participants that have been admitted and treated with either ORS or Zinc supplements in the selected PHC in Oyo State from 2017 to 2021.

Sampling Techniques

1. The participants were selected from the secondary data of the clinic record based on the exposure to the treatment with either ORS or Zinc therapy at any episodes of diarrhoea disease.

2. To ascertain whether ORS or Zinc supplements were used during the treatment, each of the participant's treatment records were checked.

4. The utilisation of the two therapies was analysed using the secondary data.

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Method of Data Analysis and Presentation

The secondary data obtained was deposited in the SPSS Version 25 program and Microsoft Excel 2013 for statistical analysis. Pearson's Chi square and *t*-test was used to determine the statistical significance in the relationships and or association between the dependent and independent variables.

RESEARCH FINDINGS

The findings of this study is as presented in the table and graph below:

Table 1: Annual reported cases of diarrhoea disease among under five children in selected PHC Centres in Oyo State, 2017-2021

Years	Cases	Percentage (%)
2017	585	22.93
2018	674	26.42
2019	454	17.80
2020	476	18.66
2021	362	14.19
Total	2,551	100%

Table 1 shows that 2,551 cases of diarrhoea disease were recorded between 2017 and 2021. Fewer cases of diarrhoea disease 362 (14.19%) were reported in 2021 when compared with the 674 (26.42%) documented in 2018.

Table 2: Age distribution of diarrhoea among under five children in Oja Igbo PHC Centres in Oyo State, 2017-2021

Age group Month (s)	Frequency (N = 2551)	Percentage (%)
< 1	619	24.3
1 -11	691	27.1
12 – 59	1241	48.6

Table 2 shows that the age group of 12-59 months presented the highest reported cases 1,241 (48.6%) of all the diarrhoea cases reported from 2017 to 2021.

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Table 3: Use of Oral Rehydration Salt and Zinc Supplements in the management of diarrhoea among under five children in selected PHC Centres in Oyo State, 2017-2021

Year	Number of diarrhoea cases	ORS use	Zinc use
2017			
< 1	103	70	33
1 – 11	154	92	64
12 – 59	328	200	128
Total	**585**	**362**	**225**
2018			
< 1	129	91	38
1 – 11	143	79	64
12 – 59	402	279	123
Total	**674**	**449**	**225**
2019			
< 1	143	77	66
1 – 11	122	80	42
12 – 59	189	103	86
Total	**454**	**260**	**194**
2020			
< 1	133	76	57
1 – 11	151	89	62
12 – 59	192	117	75
Total	**476**	**282**	**194**
2021			
< 1	111	42	69
1 – 11	121	76	45
12 – 59	130	66	64
Total	**362**	**184**	**178**

Table 3 shows that the frequency of the use of either ORS and Zinc in the management of diarrhoea among under five children at the selected PHC is directly proportional to the number of cases recorded per each age group out of which children between the age group of 12-59 months receives more treatment with ORS and Zinc.

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Table 4: Number of diarrhoea cases among under-five children that returned for treatment in the selected PHC Centres In Oyo State

Year	Number of diarrhoea cases	Percentage (%)
2017		
< 1	36	33
1 – 11	27	24.8
12 – 59	46	42.2
Total	**109**	**100**
2018		
< 1	27	27.8
1 – 11	32	33.0
12 – 59	38	39.2
Total	**97**	**100**
2019		
< 1	14	20.3
1 – 11	22	31.9
12 – 59	33	47.8
Total	**69**	**100**
2020		
< 1	23	20.1
1 – 11	41	36.0
12 – 59	50	43.9
Total	**114**	**100**
2021		
< 1	11	17.7
1 – 11	21	33.9
12 – 59	30	48.4
Total	**62**	**100**

Table 4 shows that following the treatment of the under five children with ORS and Zinc, the number of cases of diarrhoea that returned for treatment of diarrhoea between 2017 and 2021 dropped significantly from initial 585 to 109 cases in 2017 and from 362 to 64 cases in 2021.

Correlations Table

		Year	Age Range	Diarrhoea Cases	ORS	Zinc
Year	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	15				
Age_range	Pearson Correlation	0.000	1			
	Sig. (2-tailed)	1.000				
	N	15	15			
diarrhea_Cases	Pearson Correlation	-0.374	0.625*	1		

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	Sig. (2-tailed)	0.170	0.013			
	N	15	15	15		
ORS	Pearson Correlation	-0.425	0.576*	0.983**	1	
	Sig. (2-tailed)	0.114	0.025	0.000		
	N	15	15	15	15	
Zinc	Pearson Correlation	-0.222	0.656**	0.914**	0.824**	1
	Sig. (2-tailed)	0.426	0.008	0.000	0.000	
	N	15	15	15	15	15

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

A significant positive correlation was observed between number of diarrhoea cases and age range (r= 0.625; p=0.05); ORS usage and age range (r= 0.576; p=0.05) and zinc usage with age range (r= 0.656; p= 0.01); these suggest that as the age increases, number of diarrhoea cases, usage of ORS and zinc also increase.

A significant positive, near perfect correlation was also found to occur between number of diarrhoea cases and ORS usage and age range (r= 0.983; p=0.01) and number of diarrhoea cases with Zinc usage (r= 0.914; p= 0.01); translating to the fact that ORS and Zinc usages increased with increased number of diarrhoea cases. Increase in ORS usage also positively correlates with usage of zinc among the patients.

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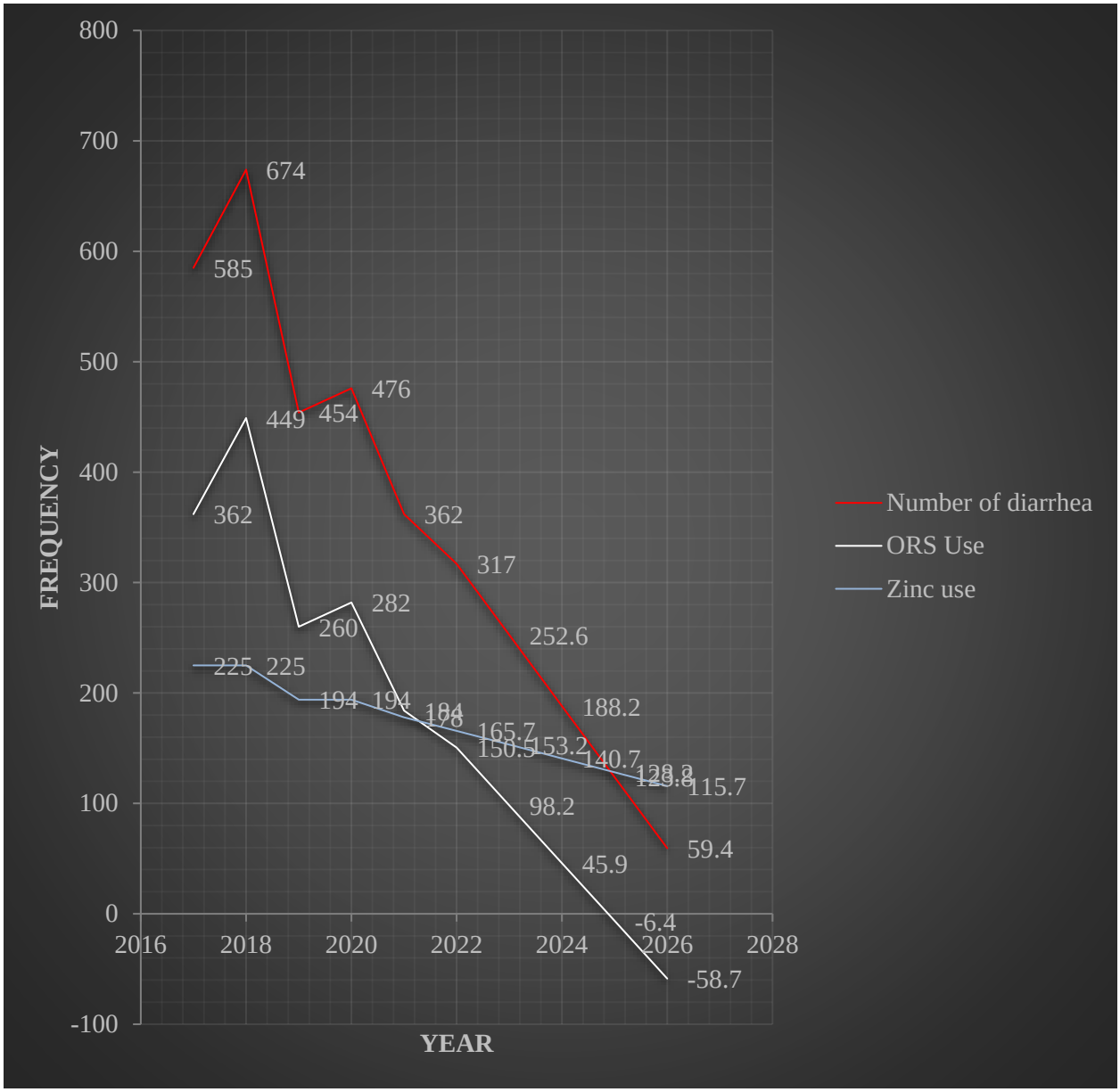

Figure 1: Forecast for diarrhoea cases in Oyo State till the year 2028 and the possible use of Zinc and ORS.

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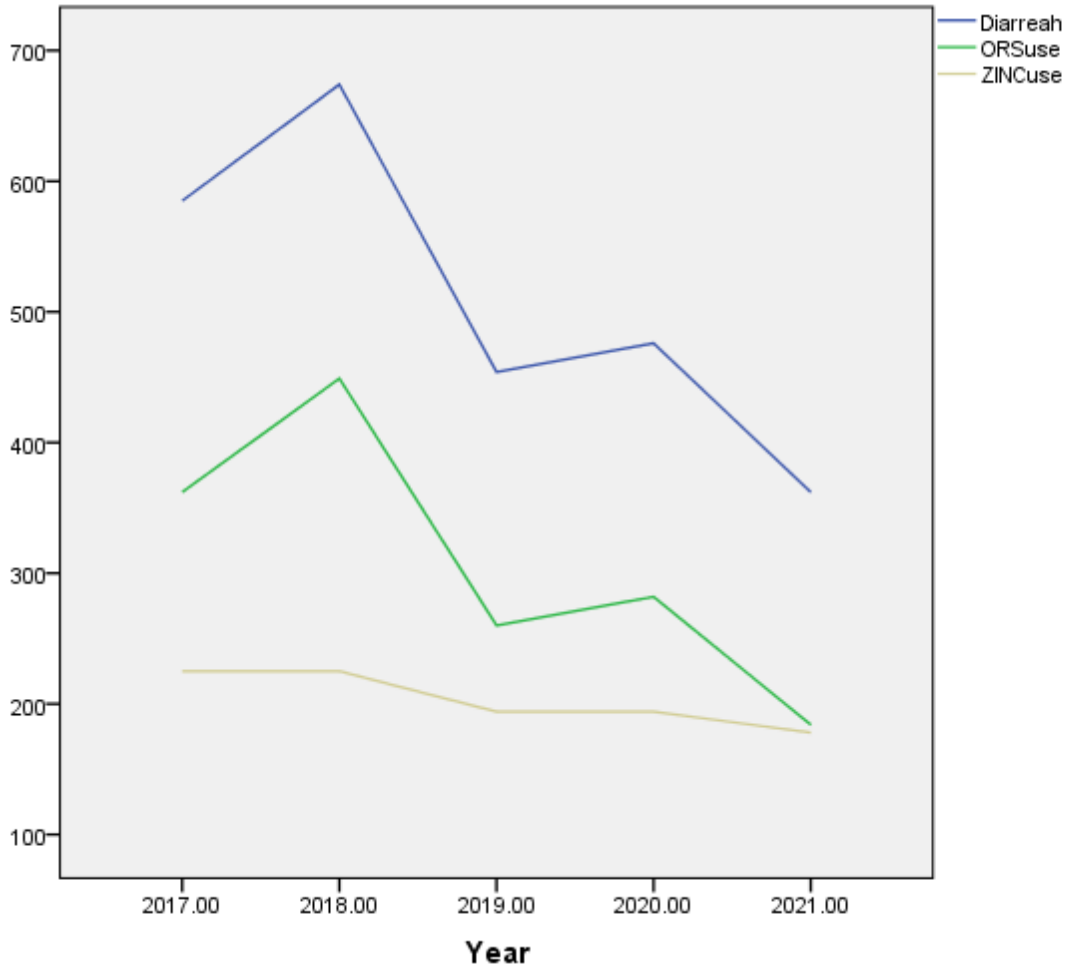

Figure 2: Time series graph of diarrhoea cases among under five years children between 2017 to 2021

Based on the time series graph, there was a decreased trend of diarrhoea cases among under five years old children between 2017 to 2021, and the projection of the researcher shows that this trend will continue up till 2028 if increased sensitization of caregivers/mothers on environmental hygiene is sustained.

DISCUSSION OF FINDINGS

This study has established the differential utilisation of two therapeutic methods (oral rehydration salt and zinc supplements) in the management of diarrhoea among under five children attending selected Primary Health Care Centres in Oyo State, Nigeria. The finding shows that out of 2,551 cases of diarrhoea disease reported in the four selected PHC between 2017 and 2021. Fewer cases of diarrhoea disease 362 (14.19%) were reported in 2021 when compared with the 674 (26.42%) documented in 2018. This huge number of diarrhoea cases in four local government of a state in Nigeria corroborated the submission of Nigeria National

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Population Commission (2018) that the diarrhoea prevalence rate among under five children in Nigeria is 10% and Peter and Umar, (2018) also says that there are a lot of vulnerable children at risk of death from diarrhoea in Nigeria. However, this report is at variance with the finding of Jiwok et al. (2021) who reported the highest annual cases of diarrhoea of 24% in 2017, and the lowest 13% in 2013 with the most affected age group to be 12–59 months contrary to a significant reduction in the number of cases as the years progresses in the present study. This may not be unconnected to the increased awareness and routine sensitization of the community people of the need to keep their environment clean and to feed the children with adequate diet and exclusive breastfeeding.

The report further stated that the age group of 12-59 months presented with the highest cases of diarrhoea disease of all the diarrhoea cases reported from 2017 to 2021. This finding is in tandem with the submission of the Nigeria Demographic and Health Survey (NDHS) (2018) which documented that diarrhoea was most common among children age 12–23 months and least common among those aged 48–59 months but was at variance with the report of Kenya Demographic and Health Survey (KDHS) (2014) that shows that the prevalence of diarrhoea is highest in children aged between 6 and 11 months, followed closely by children between the ages of 12 and 23 months. The present finding was also supported by the claim of Saha et al. (2022) in a study conducted in rural India to assess the Occurrence of Diarrheal Disease among Under-Five Children and Associated Sociodemographic and Household Environmental Factors, out of a total of 188,521 living children (0–59 months) that were studied from the National Family Health Survey-4, (NFHS-4) 2015–2016, children aged 12–23 months, 24–35 months, 36–47 months, and 48–59 months were documented to be significantly improbable to suffer diarrheal disease.

Moreso, a significant positive correlation was observed between number of diarrhoea cases and age range (r= 0.625; p=0.05); ORS usage and age range (r= 0.576; p=0.05) and Zinc usage with age range (r= 0.656; p= 0.01); these suggest that as the age increases, number of diarrhoea cases, usage of ORS and Zinc also increase. A significant positive, near perfect correlation was also found to occur between number of diarrhoea cases and ORS usage and age range (r= 0.983; p=0.01) and number of diarrhoea cases with Zinc usage (r= 0.914; p= 0.01); translating to the fact that ORS and Zinc usages increased with increased number of diarrhoea cases. Increase in ORS usage also positively correlates with usage of zinc among the patients. Meanwhile, this present finding is not in consonance with the documentation of UNICEF (2022) that in sub-Saharan Africa, progress on this important intervention has been slowed down over the last decade with coverage at 31 percent in 2011 and 36 percent in 2021. Despite the global recommendation to include ORS and zinc supplementation for diarrhoea, global coverage of this intervention also remains extremely low, especially in sub-Saharan Africa where coverage was 18 percent in 2021.

Implication of the Study for Community/Public Health Nursing Practice

Changes in the health care delivery now place community health nurses in a position to educate the caregivers of under five children on the basic preventive strategies of diarrhoea disease or at best prepare to manage the disease in accordance with the WHO recommendation of the use of the combination of ORS and Zinc supplement through appropriate and broader array of service, drawing on their skills in assessing common medical problems and capability to treat within the available resources in the community and where applicable application of their

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knowledge of primary health care. They should also be detailed with the documentation of every diarrhoea case among under five children and the appropriate management instituted.

CONCLUSION

It was concluded that the most affected age group with highest diarrhoea disease are children between the age of 12-59 months. There is a need to improve on the sensitization of the use of oral rehydration salt and zinc supplements by the health care workers in our Primary Health Care centres. Again, adequate preventive and control strategies should be put in place at the PHC, Local and State levels to reduce the number of under five-year-old children coming down with diarrhoea disease and improve on data reporting on under five diarrhoea disease.

Strengths and Limitations

To the knowledge of the researcher, this is the first study on the differential utilisation of oral rehydration salt and Zinc supplements in the management of diarrhoea among under children in Oyo State using secondary treatment data of the PHC centres. Despite the limitations, this study did not only provide information about the annual cases of diarrhoea among under five children but provides the policy makers relevant information to make a better plan for the treatment of the under five diarrhoea disease. The data presented did not capture treatment data from health facilities outside the PHC centres. This may cause under reporting. Diarrhoea disease is often reported in episodes and a child may report more than one episode within the same calendar period and as such treatment with ORS and Zinc may not be captured.

Future Research

It was proposed by the researcher that more researches need to be done to have a nationwide coverage of the case incidence of diarrhoea among under five children in Nigeria and effectiveness of the implementation of the use of Oral Rehydration Salt and Zinc Supplements in the management of under five diarrhoea disease.

Acknowledgement: The researcher appreciates the approval granted to him to make use of the treatment data of the clinics for the research. The staff of the PHC are highly appreciated.

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